Energy Transformation in Biological Systems

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This Symposium was held and published in tribute to Fritz Lipmann on his 75th birthday. Apart from this worthy and clearly achieved objective, the Symposium Chairman identified a further objective, namely 'cross-fertilisation between the distantly related subjects' represented by the various papers given and subsequently published. Whether or not that objective of fertility will have been achieved is obviously difficult to decide: have the participants subsequently produced any novel inter-disciplinary work and if not, is their silence pregnant?

There is no shortage of reviews and symposia on topics in bioenergetics, nor any lack of recognition that findings in one field may be relevant to another. But a hybrid can be sterile, as in the cross-sterilisation of mitochondrial oxidative phosphorylation by glycolytic substrate level phosphorylation. Nevertheless, contrasting viewpoints and approaches to the common problems of biological energy transformations are invigorating to the discerning reader. Although the great majority, if not all, of the material presented in the Symposium can be found published elsewhere in the scientific literature, the contrast is greatly enhanced by juxtaposition of so many diverse papers in one relatively slim volume. The discussion sections are in many ways more revealing than the papers. For instance the Symposium was more than half-completed before the courageous question was asked 'What is the Mitchell hypothesis?'. The better answers came from physiologists who, unlike biochemists, seem less prejudiced against the concepts involved. Discussions on thermodynamics were (naturally) heated. But the biggest gulf appeared to lie between the biophysicists' view of muscular contraction (all springs, mechanics, resonances, energy changes) and that of the enzymologists (rate constants and intermediates of th myosin ATPase). Both approaches seem capable of accurately describing one process (contraction) or the other (ATP hydrolysis), but what common state coup the two processes remains unidentified. And this illustrates what I felt to be the weakness of the proceedings, at the very point where they should have be strong; that is in the description of the coupling of processes rather than the processes themselves. Thus the reader interested in energy transfer between one type of process (e.g. an oxidoreduction) and another (e.g. metabolite transport) will find the processes themselves well described, and the transfer itself not Which does tend to obscure the central issue.

The merits of this volume are its readability, its variety and its contrasts. The level is suitable for post graduate students of any age (we are all postgraduates and individual chapters could be well used at advance undergraduate level. The stimulus to think laterally between the different subjects and beyond is consider able. The drawbacks include the one mentioned – the emphasis on processes more than their coupling – to which can be added the absence of contributions on neuroreceptors and chemotaxis, and, to my mind, an overemphasis on muscular contraction. Nor is there a good single account of Mitchell's work and its many implications for energy transformations. But I enjoye reading this book, and hope that it will give pleasure a stimulus to many others – just as Fritz Lipmann him has so wonderfully done for over 40 years.

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